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April 8, 2009

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Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Written Ex Parte Presentation: WT Docket No. 07-293

Dear Ms. Dortch:

During a March 6, 2009, meeting with FCC staff and representatives from the WCS Coalition, Sirius XM Radio Inc. ("Sirius XM") was asked a number of questions about the test set-up and methodology that Sirius XM used to prepare its video demonstrating the harmful effects on satellite radio reception from mobile WCS devices.[1] This *ex parte* submission provides additional details about the testing memorialized in the Sirius XM video, addressing the concerns raised at that meeting and in the WCS Coalition's subsequent *ex parte* filings.

First, Sirius XM was questioned about the equipment it used to represent a mobile WCS transmitter.[2] In particular, the Coalition wanted proof that RF signal leakage from the power amplifier used in the tests was not the primary source of interference to the satellite radio receivers shown in the video.

Sirius XM has since perfomed additional measurements demonstrating the nature of the undesired test signal that was used to make the video, which are attached to this letter as an appendix. As shown therein, the signal leakage emanating from the specific power amplifier used in the Sirius XM video demonstration was measured to be well below the out-of-band emissions "generated" by the test equipment representing the WCS mobile device. Based on these results, RF signal leakage from the power amplifier used in the Sirius XM tests could not have contributed to the interference received by satellite radio receivers as shown in the video.

[1] Letter from Robert L. Pettit, Counsel for Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, February 09, 2008 ("Sirius XM February 9th Filing")

[2] Letter from Michael A. Lewis, Engineering Advisor, Wiley Rein, LLP, Counsel for Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, March 9, 2008

Second, the WCS Coalition has questioned Sirius XM's decision to conduct its video demonstration while assuming an out-of-band emissions mask for mobile WCS devices that is not consistent with the Coalition's recommendation for a "stepped" emissions mask.[3] The Coalition has even suggested that Sirius XM may have used a different emissions mask to "cook the books" during its tests.[4]

There is no basis for this allegation. Sirius XM's measurements were consistent with the out-of-band emissions recommendations of the WCS Coalition and its members. In the written materials submitted with the video, Sirius XM stated that the WCS emissions were attenuated in the following manner to test the impact of the proposed emissions mask on the respective XM and Sirius satellite channels operating with different spectrum allocations:[5]

> WCS D Block transmissions: 55 + 10logP in the satellite spectrum
> WCS C Block transmissions: 60 + 10logP in the satellite spectrum
> WCS B-Lower Block transmissions: 60 + 10logP in the satellite spectrum

The WCS Coalition's proposal for a "stepped" emissions mask would require attenuation at the following limits:[6]

> 55 + 10logP in the 2320-2324/2341-2345 MHz bands
> 61 + 10logP in the 2324-2328/2337-2341 MHz bands
> 67 + 10logP in the 2328-2337 MHz band

[3] Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91, submitted March 9, 2009 at 2 (WCS Coalition March 9th Filing). *See also*, Letter from Paul J. Sinderbrand, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91, submitted March 19, 2009 at 3, 4 ("WCS Coalition March 19th Filing")

[4] WCS Coalition March 19th Filing at 4.

[5] Sirius XM February 9th Filing at slide 5.

[6] WCS Coalition March 19th Filing at n. 6.

In addition, two of the most active WCS members – Nextwave Wireless ("Nextwave") and Horizon Wi-Com ("Horizon") – have stated on the record that a "flat mask" of 60 + 10logP is roughly equivalent to the WCS Coalition's stepped mask proposal and is therefore an acceptable alternative to the stepped mask.[7]

Sirius XM's measurements for C Block and B Block are fully consistent with the 60 + 10logP level supported by Nextwave and Horizon. Further, the D Block measurements (55 + 10logP) are consistent with the stepped mask proposal as it would be applied to XM Radio's "B ensemble" channels that operate in the 2341-2345 MHz band. As previously explained, the XM Radio B ensemble satellite channels reside within the 2341-2345 MHz band and, therefore, are subject to the full effect of 55 + 10logP as defined within the WCS Coalition's proposal.[8] And to be clear, Sirius XM's video demonstration observed the effect of D Block transmissions to an XM Radio receiver.

Finally, the WCS Coalition has stated that Sirius XM's tests and demonstrations fail to account for operational parameters such as transmitter power control which, according to the WCS Coalition, "will yield a material reduction in possible interference to Sirius XM."[9]

Sirius XM conducted its examination of the compatibility between WCS mobile devices and the satellite radio receivers in a technology-neutral manner. Any operational features or business case models that WCS interests claim to be mitigating factors should be incorporated into any rules the Commission may adopt in this proceeding. In the case of transmit power control, Sirius XM looks forward to participating in any tests developed by the WCS Coalition demonstrating the real world capabilities of transmitter power control to mitigate interference to satellite radio receivers. However, as Sirius XM has stated, it would be insufficient for the FCC simply to mandate the use of transmitter power control without also regulating

[7] Letter from Jennifer M. McCarthy, Vice President, Regulatory Affairs, NextWave Wireless Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91, submitted November 16, 2008 at 2.

[8] Letter from Patrick L. Donnelly, Executive Vice President, General Counsel & Secretary, Sirius Satellite Radio Inc. and James S. Blitz, Vice President, Regulatory Counsel, XM Radio Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket No. 07-293, IB Docket No. 95-91, submitted May 9, 2008 at Attachment, slide 13.

[9] WCS Coalition March 19th Filing at 4.

the protocols and methodology that define system performance.[10] Power control is used not only to set the minimum power necessary to complete the radio link back to base station receivers; power control is also used to increase data throughput by increasing handset power. The latter function is inconsistent with protecting satellite receivers.

Please contact the undersigned if there are any questions on this filing.

Sincerely,

/*S/ Michael A. Lewis*
Michael A. Lewis
Engineering Advisor
Wiley Rein, LLP

Attachment

[10] Letter from James S. Blitz, Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, FCC, at page 13 of Exhibit A (filed Sep. 8, 2008).

Appendix
Power Amplifier Signal Leakage Measurements

Introduction: In a recent meeting with FCC staff present, the WCS Coalition stated that its members experienced poor performance and erroneous test results during their own test and development efforts due to excessively high RF signal leakage from power amplifiers. The WCS Coalition members indicated that the level of the signal leakage was sufficiently strong to introduce significant errors in their test results.

In response to these comments, Sirius XM investigated this issue to determine whether its own results may also have been influenced by RF leakage from the power amplifier used in its tests. These tests, summarized below, evaluated the power amplifier RF leakage effects in the WCS signal and OOBE noise spectrum measurements in both conducted and over the air test conditions.

General channel power measurements: A WCS B-Block (2310 to 2315 MHz) transmit signal was measured with WCS signal and OOBE at the WCS transmit antenna input. The target WCS signal created was a B-Block signal with transmit power of 24 dBm (250 mw) in 5 MHz. This is shown in Figure 1 as the Main Channel Power as measured with the spectrum analyzer that is within its cal period. The generated Out of Band Emissions (OOBE) was measured to be -30 dBm between 2320 and 2321 MHz. This is the amount of OOBE that would be permitted in that bandwidth with the Coalition's proposal for the OOBE limit of 60 + 10 log P for WCS mobile transmissions over the satellite radio frequency band. This is shown by the Upper Adjacent Power ratio measurement of -54.38 dB, where the channel power between 2320 and 2321 MHz frequency band was 54.38 dB less than the channel power within the B-block. With a starting power of 24 dBm in the B-block, this ratio results in 24 dBm – 54 dB = -30 dBm OOBE power in a 1 MHz block of the Sirius band. (This -30 dBm/MHz value corresponds to a 60 + 10logP OOB mask, per the Part 27 definition.) Therefore, this plot shows that the WiMAX signal was generated within the WCS band properly without any leakage issues as measured at the input to the transmitting WCS antenna.

The WCS B-Block transmit signal was then measured at the transmit antenna input with the OOBE noise source off. As can be seen in Figure 2, 24 dBm channel power was successfully generated within the B-block, and the OOBE emission levels from the WiMAX signal generator are equal on both sides of the B-block's frequency spectrum at levels near -69 dB Adjacent Channel Power. As a result, this plot shows that the signal generator successfully produced the target WCS signal, and that the B-block OOBE at the output of the power amplifier is at least more than 13 dB lower than the target OOBE levels of -30 dBm. Thus, any contribution of additional noise from the power amplifier would be insignificant to the test results.

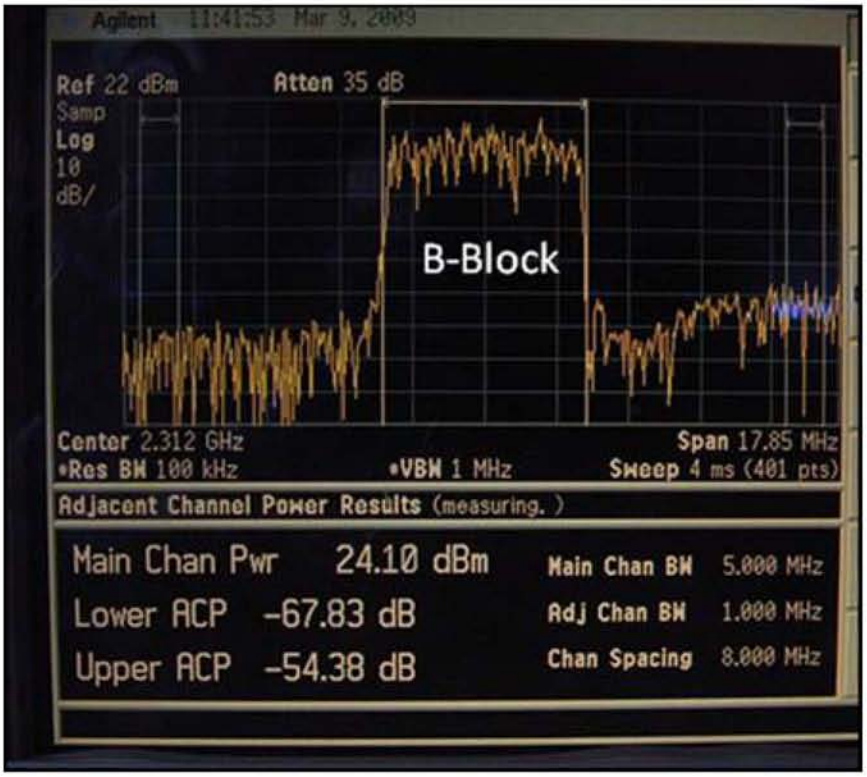

Figure 1: B-Block Transmit Signal Measurement; WCS Signal and OOBE.

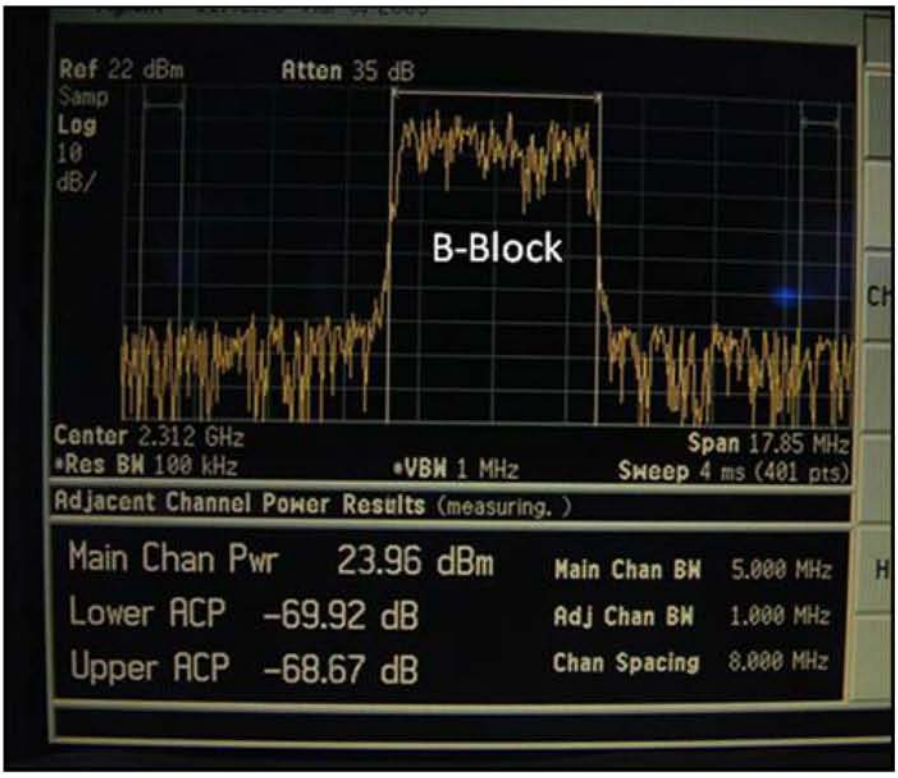

Figure 2: B-Block Transmit Signal Measurement; WCS Signal with OOBE Generator Off.

Narrowband RF leakage investigation: The Power Amplifier OOBE noise contribution was then investigated by measuring various conditions at the WCS transmit antenna input. In Figure 3, the Yellow Trace shows the Power Amplifier On (PA ON) condition without the B-Block WiMAX signal while the OOBE generator was also set to ON in order to generate 60 + 10logP mask (-30 dBm) over the Sirius band. The Cyan Trace shows the Power Amplifier off (PA OFF) condition while only the OOBE noise was ON. The Magenta Trace shows the PA ON condition without the WiMAX signal, while the OOBE generator was turned OFF. As a result, this plot shows that the noise in the Sirius band was dominated by the OOBE noise generator (generating 60 + 10logP mask level), and the PA contribution to the Sirius in-band noise level was insignificant, if any.

Figure 3: Power Amplifier OOB Noise Contribution investigation.

Sirius XM then tested whether there was any possibility of over- the- air WCS signal/OOBE leakage at the output of the Sirius XM receiver antenna as the WCS B-Block signal was received over the air. In this measurement, the Sirius XM receiver antenna's output was measured as the WCS transmitter was set at several meters away. In Figure 4, the Cyan Trace shows the ambient noise as a baseline, with the WCS WiMAX and OOBE sources off. The Magenta Trace shows the condition where the PA was ON, transmitting 250 mW WiMAX Signal within the B-block with the OOBE ON generating a noise floor at a 60 + 10 logP mask level. The Yellow Trace shows the condition where the PA was ON and the output of the coupler at the input to the WCS antenna was terminated. The OOBE generator was also OFF. In this condition, the in-band RF (over-the-air) WCS signal leakage was measured to be approximately 40 dB down from the intentional transmit power level. Also, the unintentional generation of the OOBE RF leakage was too low to be measured, as it would be similarly attenuated and far below the generated OOBE mask causing no effect.

As a result, it is determined that the OOBE from the noise generator that establishes the 60 + 10logP mask is the dominant noise source throughout the entire Sirius XM band. Also, the contribution of the leakage is negligible to none, since the unintentional in-band WCS B-block RF leakage signal was ~10,000 times less than the intentional in-band WCS B-block transmit signal.

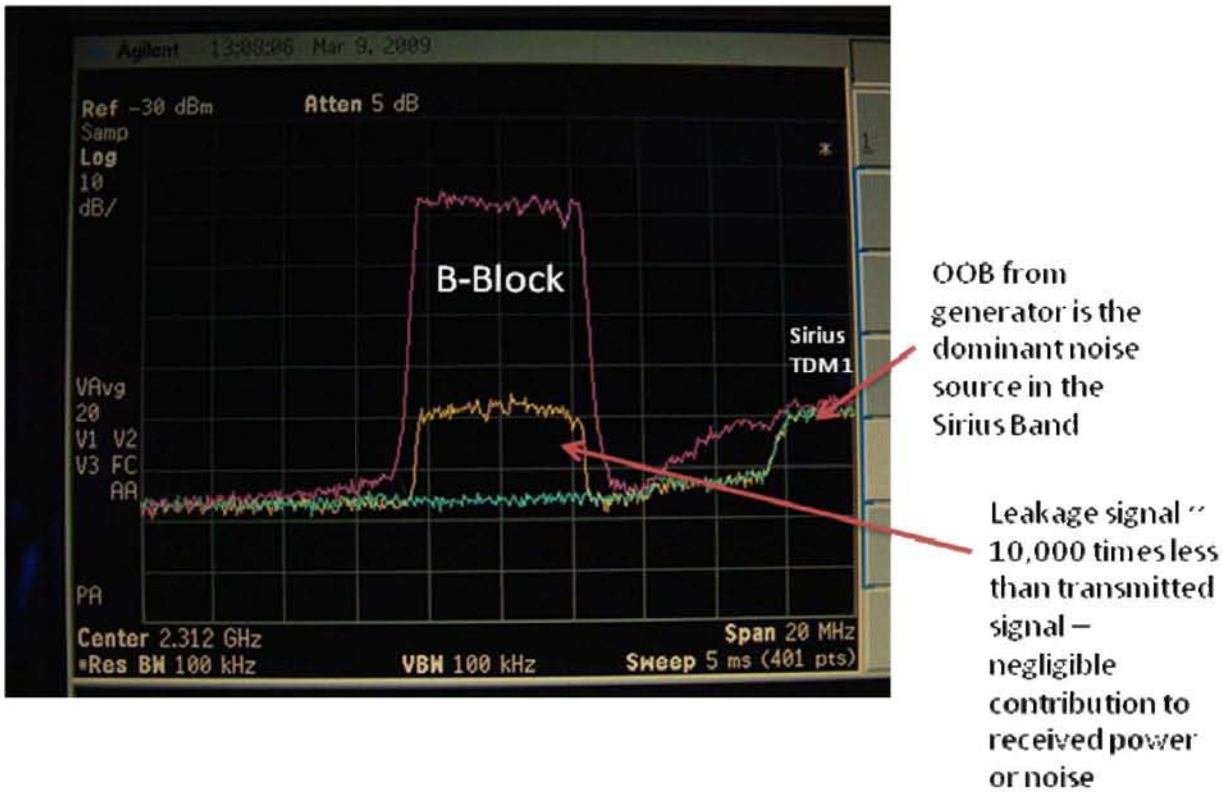

Figure 4: Investigation of Over the Air WCS Signal/OOB and Leakage At Sirius XM Receiver As The WCS B-Block Signal Was Received Over The Air.

Wideband RF leakage investigation: The preceding tests illustrate the relationship between the WCS power amplifier, OOBE noise source and any leakage emanating from the transmitter. Additional tests were performed that examined the characteristics of the WCS interference generator across the entire Sirius XM's frequency band and not just the first few megahertz. The following figures show that the intentionally generated WCS interference signal remains as the dominant interference source across the Sirius XM band, with no sign of credible or unexpected spurious components or transients due to RF leakage.

First, the WCS interference output was measured in a conducted environment to ensure that there were no unexpected emissions in the Sirius XM band. Figure 5 shows the spectral performance of the WCS B-Block WiMAX signal generator (with PA and channel filtering) and OOBE noise source (simulating an emitter with 60 + 10logP OOBE mask, 5 dB below the WCS Coalition's proposed 55 + 10logP mask level) between 2300 MHz and 2333 MHz. This figure was captured using the Max Hold

display function, which logs the peak power at each frequency point. Using this method, any spurious or transient emissions would be clearly shown, and it can be seen that there are no such emissions in the 2320 - 2332.5 MHz portion of the Sirius XM band (*i.e.*, the "Sirius Band"). As expected, the OOBE noise is nearly equal to 46 dB below the WCS B-block channel power within 1 MHz even in the Max-Hold mode, considering the individual crest factors of the generated WCS in-band channel and out-of-band emissions, as measured in the figure.

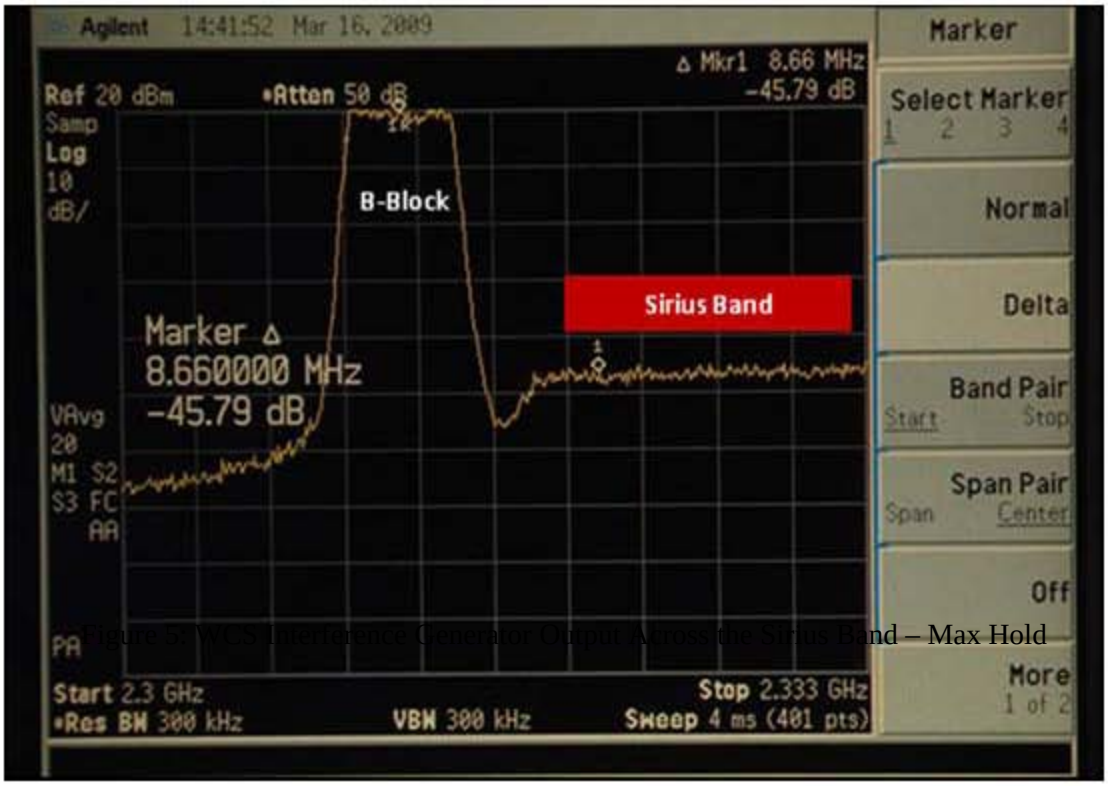

Figure 5: WCS Interference Generator Output Across the Sirius Band – Max Hold

Figures 6 and 7 show the corresponding received signals at the Sirius XM antenna output, with the WCS transmitter approximately three meters away in this over-the-air measurement. These figures show the Max Hold and Averaged received spectra, respectively. The yellow traces show the composite received signal consisting of the generated WCS B-block signal and the OOBE noise, while the cyan traces show the received OOB noise only. It can be seen that in both plots the ratio of WCS signal to OOB noise is consistent with the conducted measurement, that there is no additional RF energy pickup over the air (i.e. unintentional RF leakage from the WCS transmitter setup). Since the noise in the Sirius Band is the same with the power amplifier ON or OFF, it is clear that the OOBE noise generator level is the dominant factor, and the power amplifier is not adding any meaningful power within the Sirius band. It should also be noted that the Sirius Band satellite signals are not clearly identifiable as the received WCS OOBE signal is stronger than the satellite downlink power.

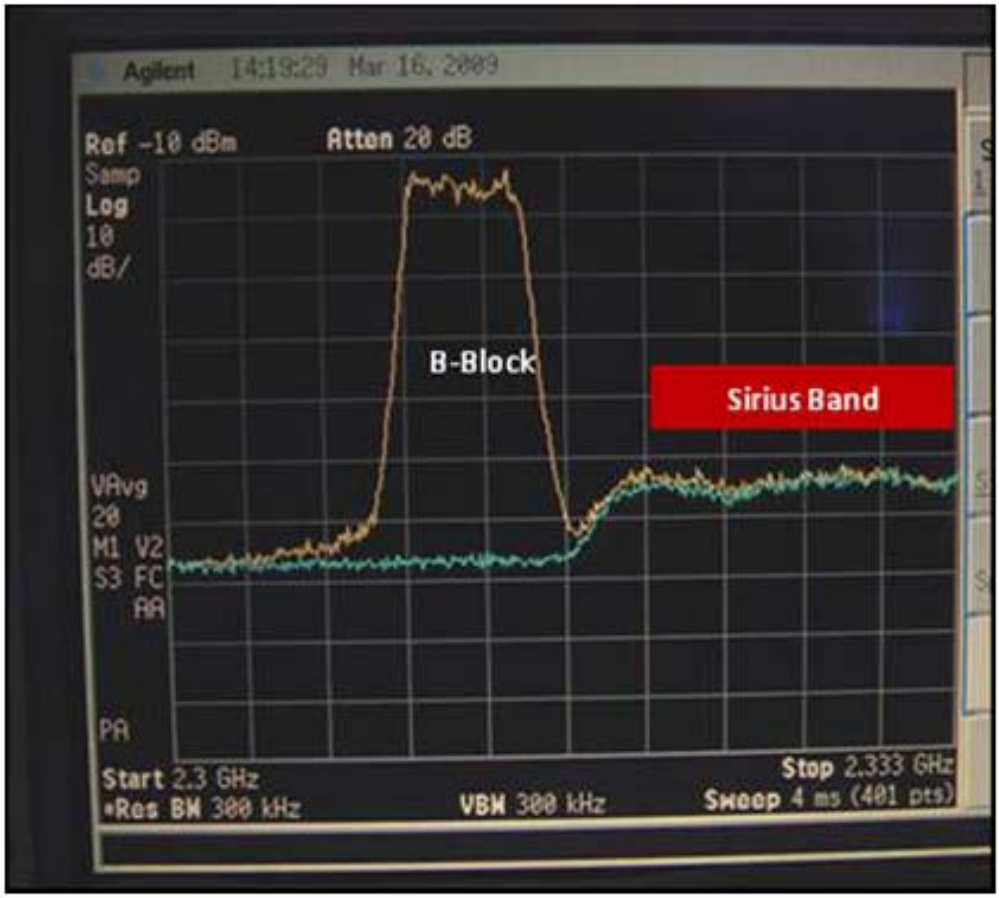

Figure 6: Received WCS Signals – Max Hold

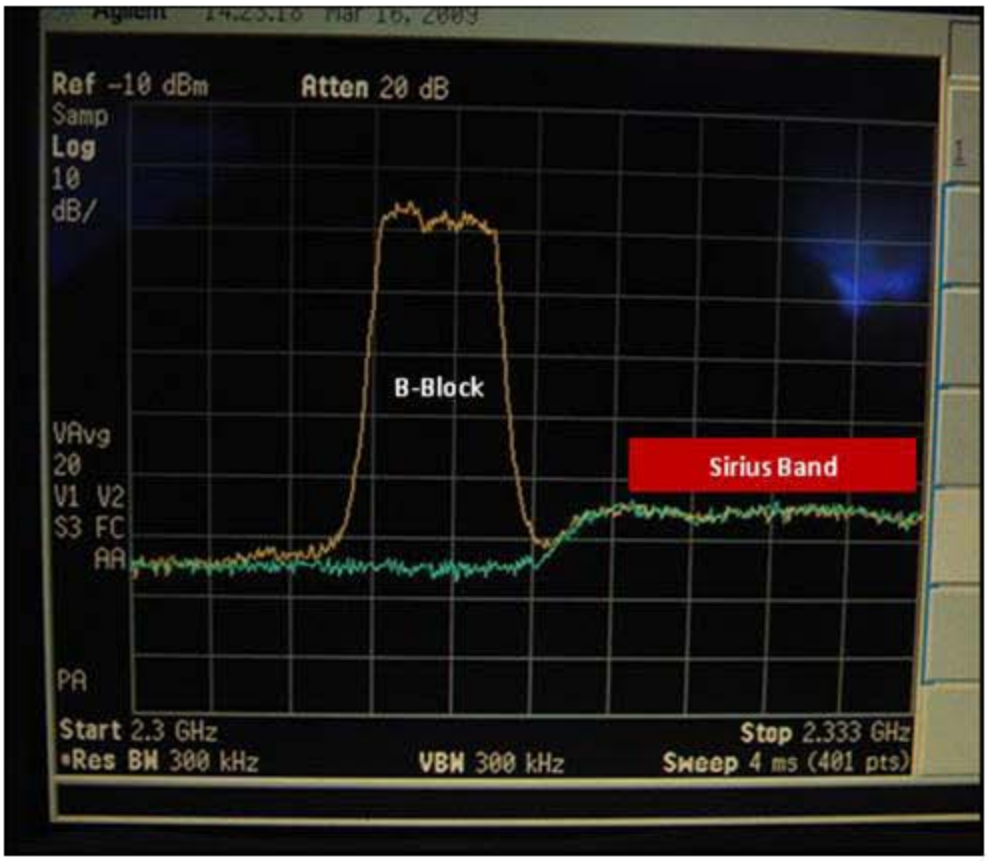

Figure 7: Received WCS Signals - Averaged

Finally, another leakage test was performed, this time while monitoring the entire Sirius band. Figure 8 shows the received WCS signal and OOBE noise dominating the Sirius band (yellow trace); the baseline Sirius satellite powers with no interference (cyan trace) and the RF leakage signal from the WCS transmitter with the antenna port terminated (magenta). As observed previously, the unintentional RF leakage signal is approximately 40 dB down from the intentional RF (over-the- air) WCS signal, and does not contribute in any meaningful way to the amount of the total received interference power. It is also evident that a) since the cyan baseline Sirius signal trace (with no interference) and the magenta trace with the leakage signal are identical across the Sirius band, and b) any leakage from the transmitter is also at least 40 dB lower than the main emission, the RF leakage signal is not contributing any significant noise power within the Sirius XM band.

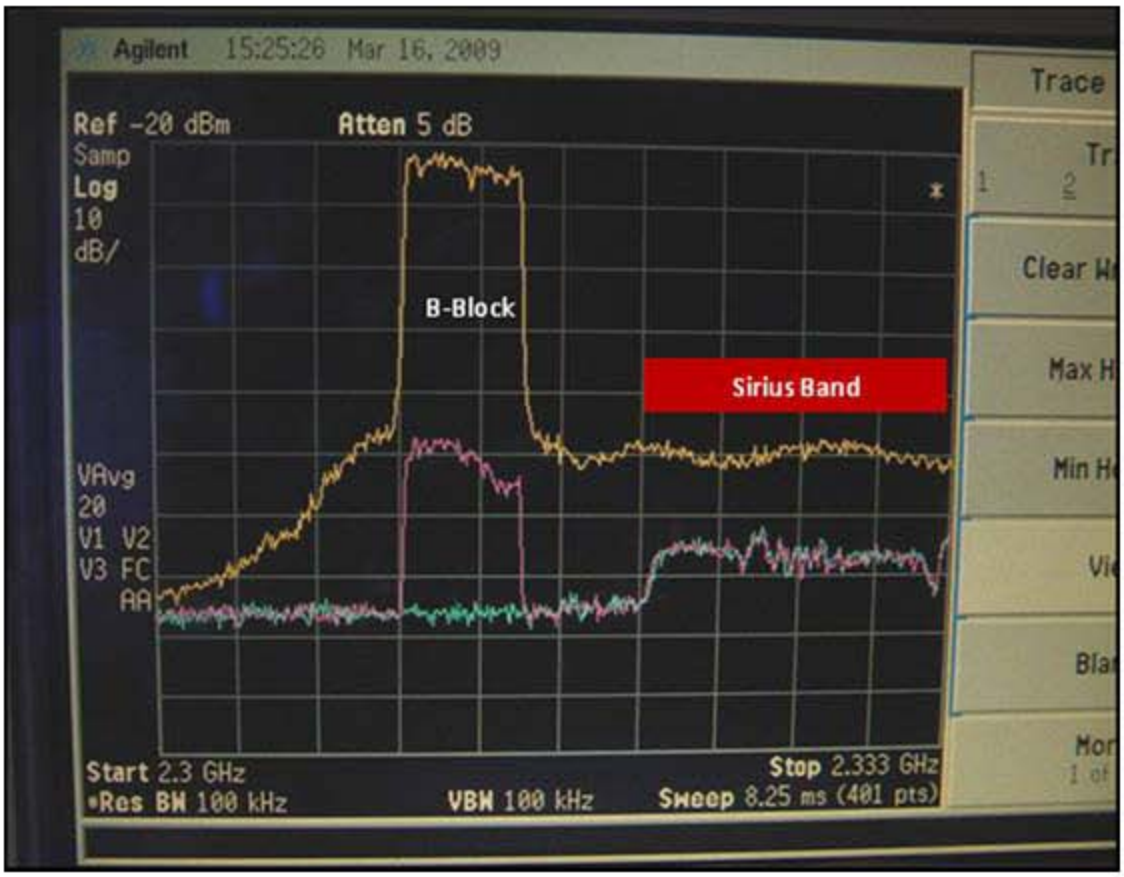

Figure 8: Leakage measurement across the WCS and Sirius bands

Conclusion: These measurements establish that the test equipment as well as the Power Amplifier and the other equipment used in the Sirius XM testing of the WCS interference into the SDARS band is adequate and accurate for this type of testing. After verifying that the simulated channel power of the OOBE noise within the 2320 and 2321 MHz frequency band was approximately 55 dB (54.38 dB to be precise) below the channel power within the B-block, it was confirmed that the test equipment did not create any additional significant level of leakage as measured and verified through this conducted and over-the-air testing.